GGOS Report

presented by
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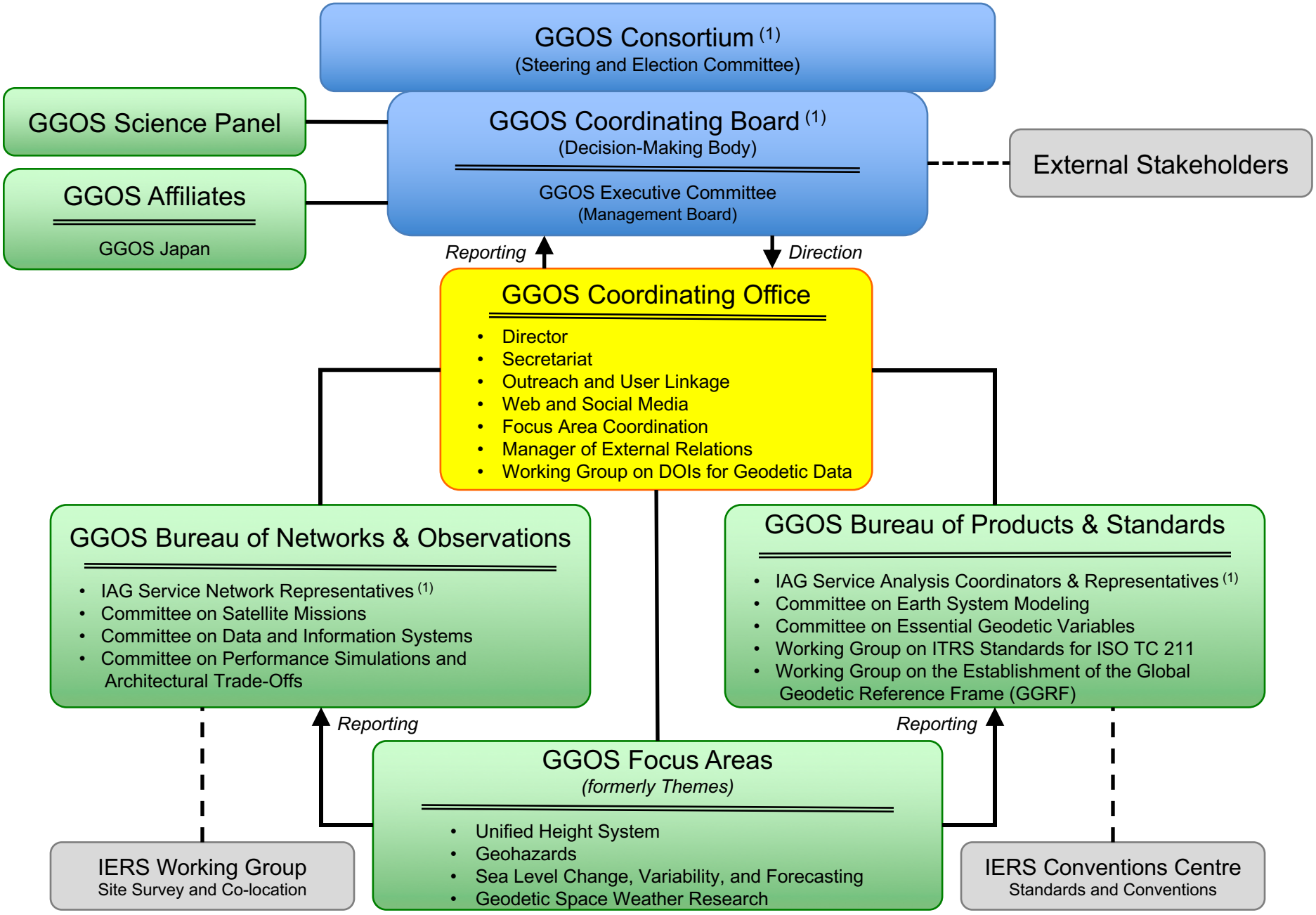
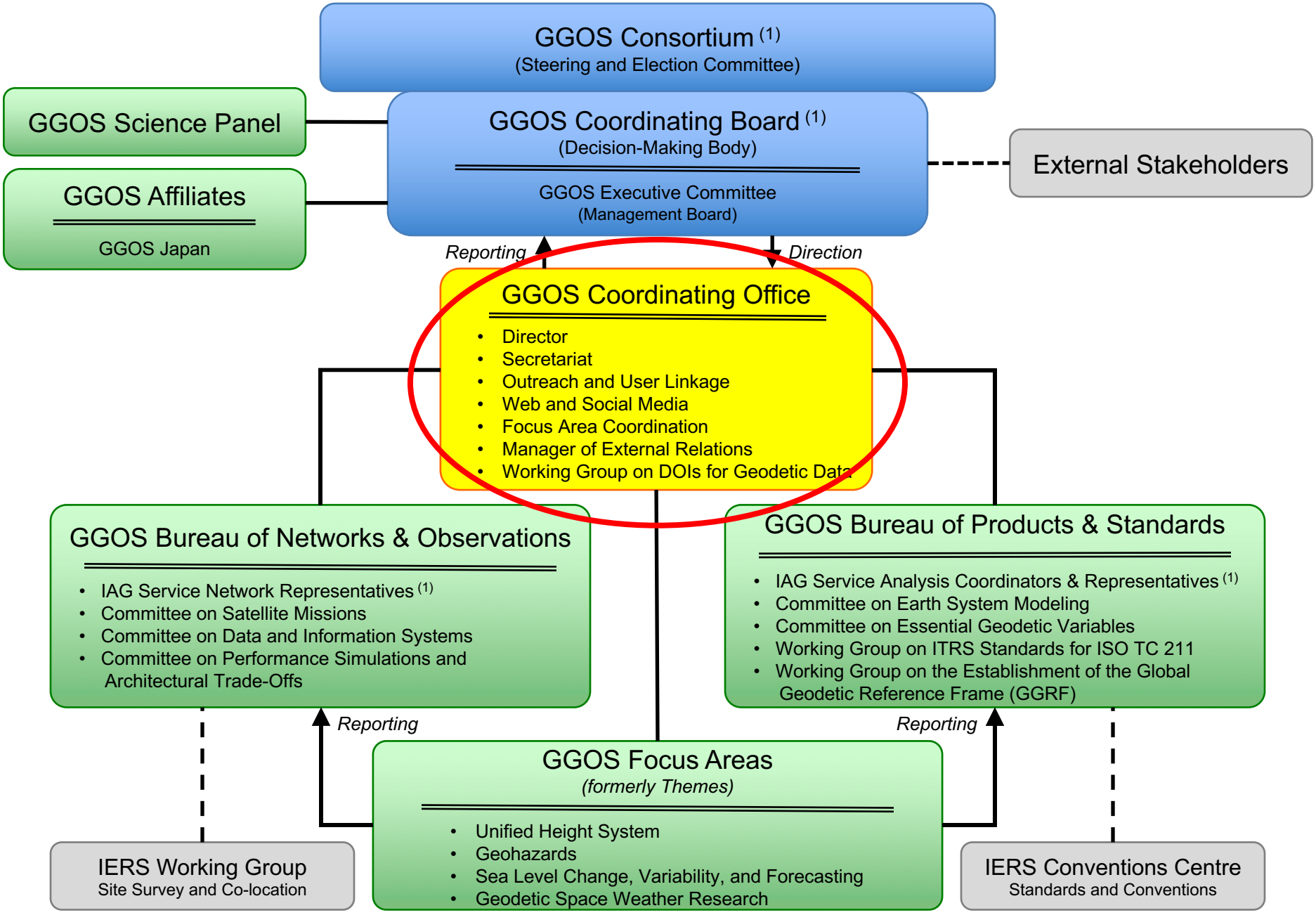
International Earth Rotation and Reference Systems Service
Directing Board Meeting

April 7, 2019
Vienna, Austria



(1) GGOS is built upon the foundation provided by the IAG Services, Commissions, and Inter-Commission Committees



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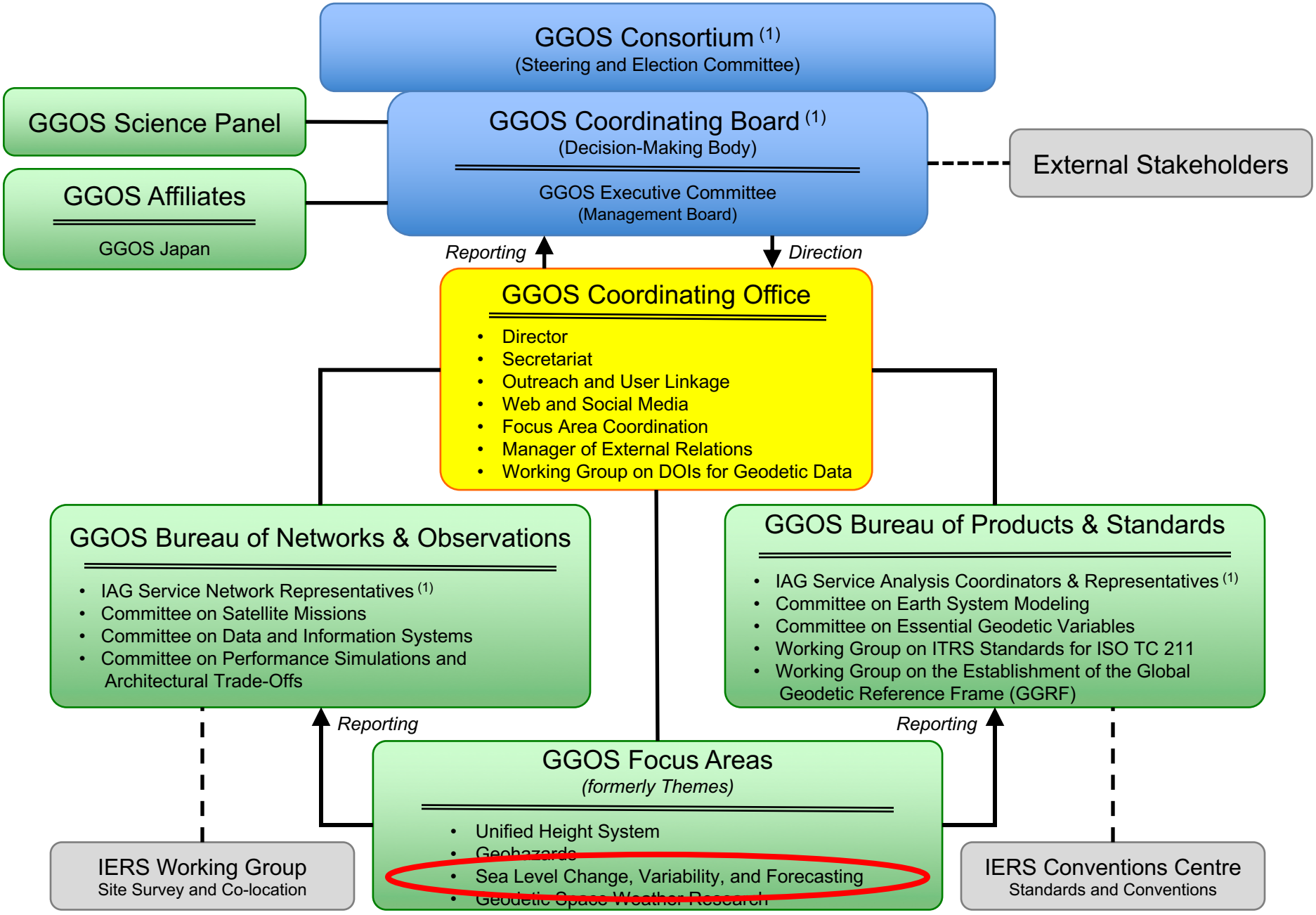
Coordinating Office

- Host of Coordinating Office
  - Bundesamt für Eich- und Vermessungswesen (BEV)
- Director of Coordinating Office
  - Matthias Madzak
    - Resigned effective 31 October 2018
    - To take position in industry
- New Director of Coordinating Office
  - Helmut Titz
    - Effective 17 December 2018
  - Martin Sehnal
    - Will continue to assist



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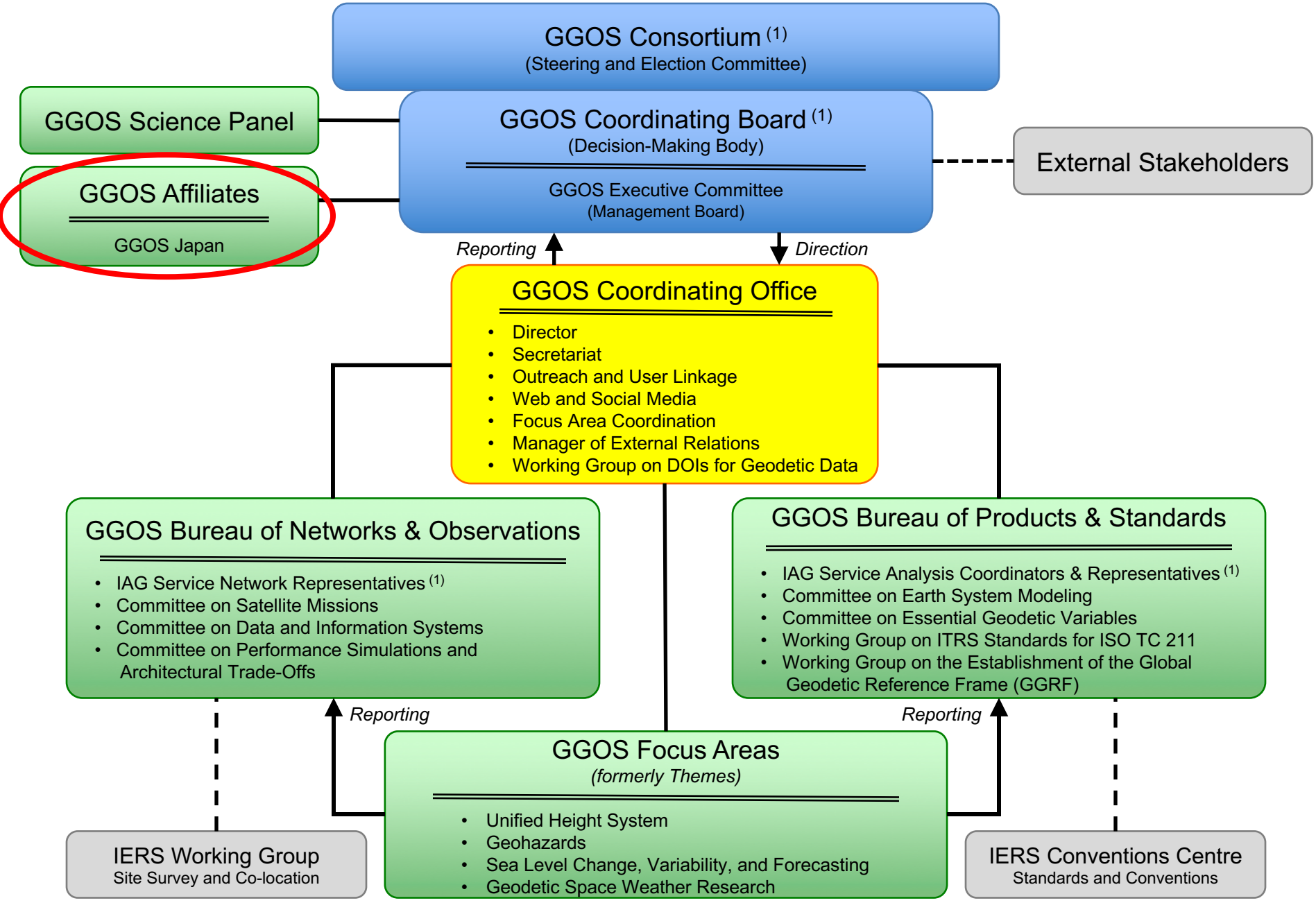
GGOS Focus Area on Sea Level

- Lead of Focus Area
  - Tilo Schöne
    - Resigned effective September 30, 2018
- Currently discussing options for continuation
  - Continue current focus
    - Liaise with sea level community
  - Redirect focus
    - Incubator for International Altimetry Service



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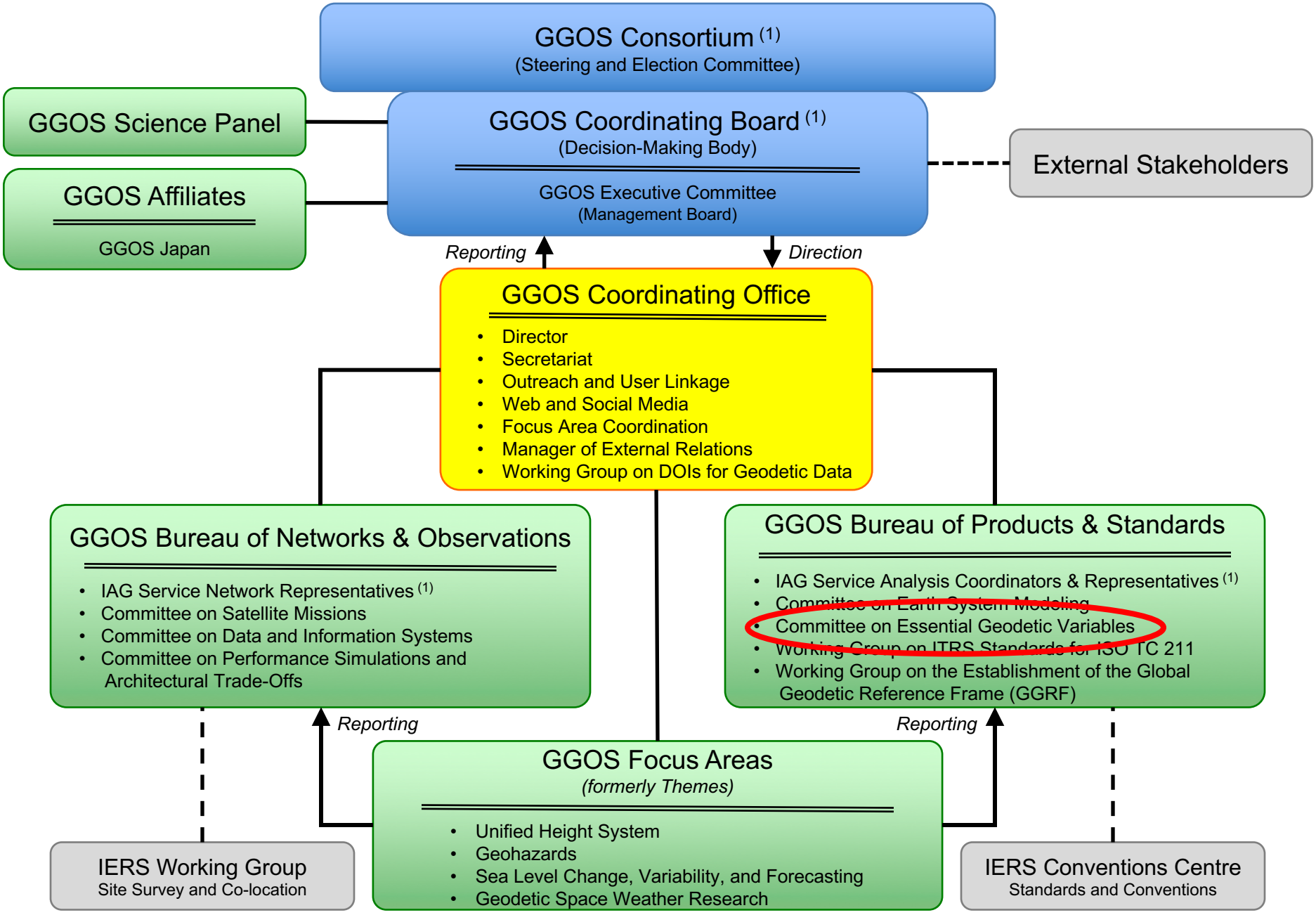
GGOS Affiliate

- National or regional organization
  - That coordinates space-geodetic activities there
- Established to increase participation in GGOS
  - Particularly from under-represented areas
    - Africa, Asia, South and Central America
- Is a component of GGOS
  - With representation on Consortium and Coordinating Board
    - Each GGOS Affiliate has 1 representative to Consortium
    - Collectively they have 2 representatives to Coordinating Board
- First GGOS Affiliate
  - GGOS Japan
    - Established in 2013; Chair: Toshi Otsubo of Hitotsubashi University, Japan
    - Provides forum for multi-technique, space-geodetic discussions within Japan
    - Strives to improve quality of observations & encourage collaboration in Japan
- Encourage others to become GGOS Affiliates
  - Held discussions to encourage new GGOS Affiliates
    - Spain; German (DACH?) Geodetic Commission; Nordic Geodetic Commission



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Essential Geodetic Variables

- Observed variables
  - Crucial to characterizing geodetic properties of Earth
  - Key to sustainable geodetic observations
    - Positions of reference objects (ground stations, radio sources), EOPs
    - Gravity measurements (ground-based, space-based)
- Assign requirements to each EGV
  - Accuracy, spatial and temporal resolution, latency, stability, …
- Derive requirements
  - On EGV-dependent products (TRF, CRF, …)
  - On infrastructure (observing systems)
- Can be used to update GGOS2020 book
  - Bottoms-up approach to deriving requirements
    - Complements top-down approach used in GGOS2020 book (user needs)
- Established Committee within GGOS BPS
  - To create list of EGVs, assign requirements to them, etc.
  - Committee includes representatives of
    - IAG Services, Commissions, Intercommission Committees, GGOS Focus Areas

Committee on EGVs

GGOS
- Detlef Angermann (Germany)
- Richard Gross, Chair (USA)
- Harald Schuh (Germany)

GGOS Focus Area 1
(Unified Height System)
- Bernhard Heck (Germany)

GGOS Focus Area 2
(Geohazards Monitoring)
- Diego Melgar (USA)

GGOS Focus Area 3
(Sea Level Change)
- Don Chambers (USA)

GGOS Focus Area 4
(Space Weather)
- Ehsan Forootan (UK)

IAG Commission 1
- Markus Rothacher (Switzerland)
- Geoffrey Blewitt (USA)

IAG Commission 2
- Kosuke Heki (Japan)
- Thomas Gruber (Germany)

IAG Commission 3
- Jianli Chen (USA)
- Jose Ferrandiz (Spain)

IAG Commission 4
- Jens Wickert (Germany)
- Pawel Wielgosz (Poland)

IAG ICC Theory
- Yoshiyuki Tanaka (Japan)
- Mattia Crespi (Italy)

IERS
- Tom Herring (USA)

IGS
- Tom Herring (USA)
- Michael Moore (Australia)

ILRS
- Erricos Pavlis (USA)
- Jürgen Müller (Germany)

IVS
- John Gipson (USA)
- Johannes Böhm (Austria)

IDS
- Laurent Soudarin (France)
- Jean-Michel Lemoine (France)

IGFS
- Urs Marti (Switzerland)
- Georgios Vergos (Greece)

BGI
- Sylvain Bonvalot (France)

ICGEM
- E. Sinem Ince (Germany)

ISG
- Jianliang Huang (Canada)

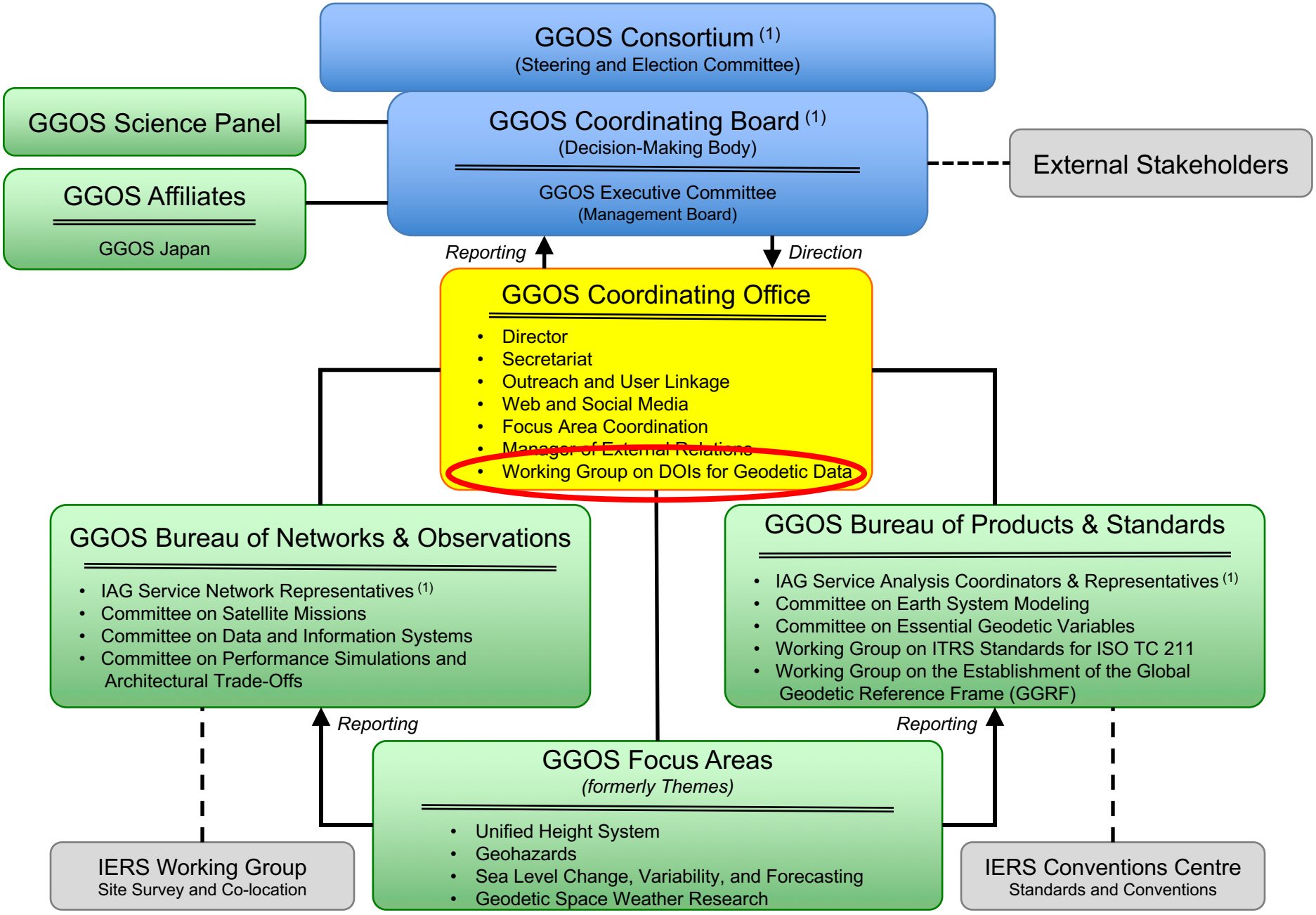
IGETS
- Hartmut Wziontek (Germany)
- Jean-Paul Boy (France)

IDEMS
- Christian Hirt (Germany)
- Michael Kuhn (Australia)

PSMSL
- Svetlana Jevrejeva (UK)

BIPM
- TBD

Total: 35



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DOIs for Geodetic Data

- Digital Object Identifiers (DOIs) for publications
  - Widely used by publishers
    - More than 5000 publishers participate in DOI system
  - Unique identifier of publication
    - DOI is resolved into URL where the publication can be found (landing page)
    - Landing page contains abstract of publication, PDF, etc.
  - DOI system managed by International DOI Foundation (IDF)
- DOIs for data sets
  - Benefits to users
    - Easy access to data cited in journal article – just click on DOI
    - Improves traceability of published results – eliminates confusion about data used
    - Improves discoverability of data sets – enables wider distribution of data sets
  - Benefits to data providers
    - Providers can include information about data set on landing page (metadata)
    - Easily allows number of data publications to be tracked
    - Allows number of times data is used to be counted
    - Allows data providers to receive proper credit for their published data

DOIs for Geodetic Data, cont.

- Registration agency
  - Manages DOI to URL mapping
    - Established by interested community (geodetic community)
    - Qualified by International DOI Foundation
  - Develops registration server to share among data providers
    - Registration agency assigns DOI prefix, data provider suffix: doi:prefix/suffix
- Granularity of DOI assignment
  - One data set = one DOI
    - Even if data set is updated
    - Example: IVS contribution to ITRF2014 (data set does not change)
    - Example: IGS Final combined EOPs (data set changes, but not file name)
- Establish Working Group
  - Representatives of Services, data centers
  - Establish procedures for assigning DOIs to geodetic data sets
    - Registration Agency
    - Standardized DOI naming convention
    - etc.

External Organizations

GGOS Representation

- Group on Earth Observations (GEO)
  - IAG is Participating Organization & member of Program Board
    - GGOS represents IAG
  - Program Board
    - Manages GEO Work Program
    - IAG/GGOS participates in Sub-Groups on Sendai & Sustainable Earth Obs.
    - Will meet 5 times in 2019 (February, March, June, September, November)
      - To establish 2020–2022 Work Progam
  - GEO Week 2018
    - 29 October 2018 to 02 November 2018; Kyoto, Japan
    - IAG/GGOS delegation: R. Gross
- Committee on Earth Observation Satellites
  - GGOS is an Associate Member
    - Participates in Ad Hoc Team on Sustainable Development Goals
  - 32nd CEOS Plenary
    - 16–18 October 2018; Brussels, Belgium
    - GGOS delegation: R. Gross
      - Gave presentation on geodetic observations and importance of TRF to Earth obs.

Upcoming Meetings

GGOS at Conferences

- European Geosciences Union
  - Vienna, Austria; 07–12 April 2019
  - GGOS Session
    - *The Global Geodetic Observing System: Essential Variables for Geodesy*
    - Conveners: K. Heki, D. Angermann, R. Gross, M. Madzak, M. Pearlman
    - 13 presentations in 1 poster session (09 April 2019; 08:30–10:15; Hall X3)
  - No Bureau meetings this year
    - Instead, they will be held in conjunction with the IUGG
  - PLATO Working Group Meeting
    - Technical University Vienna; Room SEM 124; 08 April 2019; 13:30–15:00
    - Chairs: Daniela Thaller and Benjamin Männel
- American Geophysical Union
  - San Francisco, CA; 09–13 December 2019
  - GGOS Session
    - Proposal for GGOS session being prepared (due 17 April 2019)

IUGG 2019

- Venue
  - Palais des Congrès, Montréal, Canada
  - 08–18 July 2019
- GGOS Symposium G06
  - *Monitoring and Understanding the Dynamic Earth with Geodetic Observations*
  - Conveners; R. Gross, D. Angermann, M. Madzak, T. Otsubo
  - 99 presentations in 14 sessions (13 oral, 1 poster)
  - Schedule of oral sessions (tentative)

    July 14, 10:30-12:00 Introduction to GGOS
    July 14, 13:30-15:00 Focus Area on Geodetic Space Weather Research I
    July 14, 16:30-18:00 Focus Area on Geodetic Space Weather Research II
    July 15, 08:30-10:00 Bureau of Products and Standards
    July 15, 10:30-12:00 Regional GNSS Networks
    July 15, 13:30-15:00 Focus Area on Geohazards I
    July 15, 16:30-18:00 Focus Area on Geohazards II
    July 16, 08:30-10:00 Bureau of Networks and Observations I
    July 16, 13:30-15:00 Bureau of Networks and Observations II
    July 16, 16:30-18:00 Focus Area on Unified Height System
    July 17, 08:30-10:00 Satellite Observations
    July 17, 10:30-12:00 Environmental Effects
    July 17, 13:30-15:00 Marine Gravity, Water, and Earthquakes
- GGOS Coordinating Board meeting
  - Tuesday, 16 July 2019; 12:00–13:30 (to be confirmed)
- GGOS Bureau meetings
  - Not yet scheduled

Unified Analysis Workshop 2019

- Venue
  - Institut de physique du globe de Paris (IPGP), Paris
  - 02–04 October 2019
- Program (tentative)
  - Topics specific to each technique
    - Systematic errors and biases in each technique
    - Status of next generation observing systems
  - Topics common to all techniques
    - Reference systems and frames (including preparation for ITRF2020)
    - Model improvements
    - Site surveys
    - Co-location of techniques (including with gravity, unified height system)
    - Standards, conventions and formats
    - Digital Object Identifiers (DOIs) for geodetic data sets
    - Essential Geodetic Variables
- Attendance
  - By invitation
    - 5–6 representatives from each Service

UAW 2019 Participants

GGOS

M. Chin
R. Gross

IERS

IGS

IVS

IDS

ILRS

IGFS

Total: ~50

These Journées 2019 are sponsored by Paris observatory, CNRS-INSU, GRAM and co-sponsored by the International Astronomical Union (IAU) and the International Association of Geodesy (IAG). They are in the direct continuation of the recurrent Journées which have been organized with success during more than two decades. The main purpose of this international meeting is to provide a forum for advanced discussions in the fields of astrometry, Earth rotation, space and time reference systems and frames, solar system dynamics and ephemerides, time metrology and space navigation. A particular attention will be given to the recent progress made in the fields of astrometry due to the exploitation of the Gaia mission and to the recently adopted ICRF3, as well as to the celebration of the Centenary of the IAU commission "Rotation of the Earth", with scientific and historic contributions. A session will be dedicated to B.Kolaczek and J.Kovalevsky achievements.

https://syrte.obspm.fr/astro/journees2019/index.php?page=presentation

GGOS Days 2019

- Venue
  - To be held in parallel with SIRGAS2019 Symposium
    - But 1 day will be joint with SIRGAS2019
  - Rio de Janiero, Brazil; 11–14 November 2019

Global Geodetic Observing System

1. Requirements-setting organization for geodesy
   - GGOS 2020 book and its update
   - Essential Geodetic Variables
2. Forum for international collaboration
   - Improve integrated, global geodetic infrastructure
   - Improve geodetic products
     - Unified Analysis Workshops
3. Advocate for geodesy to broader community
   - Group on Earth Observations; Committee on Earth Obs. Satellites
     - Provide Earth observations (including geodetic) needed to make informed decisions
   - UN-GGIM Subcommittee on Geodesy
     - Emerging policy-making organization in geodesy
     - Emerging forum for international collaboration
4. Incubator for new initiatives in geodesy
   - Unified Height System
   - Sea Level Change, Variability, and Forecasting
   - Geohazards
   - Geodetic Space Weather Research

شكراً جزيلاً
ngiyabonga
рахмат
danke
謝謝
teşekkür ederim
Баярлалаа
mersi
kia ora
barka
welalin
tack
spas
mahalo
tapadh leat
спасибо
faafetai lava
vinaka
спасибі
blagodaram
dank je
misaotra
matondo
paldies
grazzi
gracias
kiitos
dankie
nanni
nandri
dhanyavad
thank you
хвала
asante
manana
obrigada
tenki
bedankt
bayarlalaa
gracje
hvala
maururu
köszönöm
akun dankon
aciu
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sulpáy
taiku
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sobodi
dēkuji
sagolun
sukriya
kop khun krap
arigatô
takk
dakujem
trugarez
obrigado
mèsi
didi madloba
ありがとう
tanemirt
grazie
najis tuke
terima kasih
rahmet
ευχαριστώ
diolch
dhanyavadagalu
shukriya
mercê
мерси
kam sah hamnida
rahmat
তোমাকে ধন্যবাদ
감사합니다
xièxie
merci